**SECTION 33 41 00**

**STORM SEWER SYSTEMS**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes:
1. Storm sewer pipe.
2. Manholes and appurtenances.
3. Catch basins and appurtenances.
4. Aprons.

B. Related Sections:
1. Section 31 23 33 - Trench Excavation and Backfill
2. Section 33 05 50 - Surface Facility Restoration

C. Method of Measurement:
1. Pipe:
   a. Measure by distance in linear feet.
   b. Measure from structure centers and pipe ends not including end sections.
   c. Measure each pipe size and class separately.
   d. Measurement includes pipe bedding per Standard Drawings unless otherwise stated in Contract Documents.
2. Manholes:
   a. Measure by height in linear feet to the nearest 0.1 foot.
   b. Measure from the lowest invert to the top of the casting.
   c. Measure each size and type separately.
3. Catch Basins:
   a. Measure by height in linear feet to the nearest 0.1 foot.
   b. Measure from the lowest invert to the top of the casting.
   c. Measure each size and type separately.
4. Castings: Measure each type installed as a unit.
5. Aprons: Measure each size and type installed as a unit.
6. Riprap: Measure by volume in cubic yards of material inplace.
7. Connect to Existing Storm Sewer: Measure each connection as a unit.
8. Dewatering: Incidental and no measurement will be made for dewatering unless otherwise specified in Contract Documents and included as a pay item.

D. Basis of Payment:
1. Payment for acceptable quantities of storm sewer items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

### 1.02 REFERENCES

A. ASTM:
1. A48 - Specification for Gray Iron Castings
2. C76 - Specification for Reinforced Concrete Pipe
3. C361 - Specification for Reinforced Concrete Low Head Pressure Pipe
4. C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
5. C478 - Specification for Precast Reinforced Concrete Manhole
6. D2321 - Recommended Practice for Installation of Flexible Thermo-Plastic Sewer Pipe
7. F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
8. F667 - Standard Specifications for Large Diameter Corrugated Polyethylene Pipe and Fittings

### 1.03 SUBMITTALS

A. Submit Certification of Compliance from manufacturer certifying materials meet the respective requirements listed in Article 1.02.

B. Provide Shop Drawings for each structure.

## 1.04 DELIVERY OF MATERIALS

A. Inspect all pipe and materials during the unloading process.

B. Notify Engineer of any cracked, flawed or otherwise defective material.

C. Remove all materials found to be unsatisfactory by Engineer from the Site.

# PART 2 PRODUCTS

## 2.01 PIPE

A. Reinforced Concrete:
   1. MnDOT Specification 3236
   2. Class: See Drawings.
   3. Formed rubber gasket per ASTM C443.

B. ADS or Approved Equal

C. Provide all pipe from the same manufacturer.

D. **No** PVC or corrugated metal pipe (CMP) shall be used for mainline storm sewer within the public Right-of-Way unless previously approved by the City Engineer.

## 2.02 MANHOLES AND CATCH BASINS

A. ASTM C478 & MnDOT 2506.

B. See Drawings for diameter.

C. Provide gasket joint per ASTM C443.

D. Provide base, cone section or cover slab as shown on Drawing details.

E. Manhole Steps:
   Manholes shall **not** have steps unless otherwise specified.

F. Covers and Frames:
   1. ASTM A48:
      a. Neenah R-1733-Heavy Duty – Storm Sewer Manholes
      b. Neenah: R-3067V – Catch Basins
   2. Storm sewer manhole covers shall have "Storm Sewer" displayed in 2" letters.
   3. Cover with 2 concealed pick holes.
   4. Casting assemblies or dimensions, details, weights, and class shall be as indicated in the detailed drawings for the design designation specified. Unless otherwise specified, the casting shall be Class 30 or better.
   5. Lid-to-frame surfaces on round casting assemblies shall be machine milled to provide true bearing around the entire circumference.
   6. Casting weight shall be not less than 95 percent of theoretical weight for a unit cast to exact dimensions, based on 442 pounds per cubic foot.

G. Adjusting Rings:
   1. Reinforced Concrete
   2. Minimum of 1 and maximum of 4 adjusting rings.

H. Concrete Collar
   1. Curb and gutter mix or mortar mix (Spec. 2506.2B)
      a. Encase casting and concrete adjusting rings
      b. 6" minimum thickness

I. Mortar:
   1. ASTM C270
   2. Air-entrained of one part masonry cement, Type M, and two parts mortar sand, with sufficient water to produce proper consistency, and with sufficient air-entraining agent added to maintain an air content within the range of  to 10 percent.

## 2.03 APRONS

A. Provide the same strength class as the pipe.

B. Provide galvanized trash guards on aprons as specified on the Plans or as directed by Engineer.

## 2.04 RIPRAP

A. In accordance with MnDOT 2511

B. Class III unless otherwise specified.

C. Individual stones not less than 50 lbs each

D. Filter Materials for riprap:
   1. MnDOT 3601 – Granular Filter

2. MnDOT 3733 – Type II Geotextile Fabric

## PART 3 EXECUTION

### 3.01 PREPARATION

A. Contractor shall notify City Engineer at least 48 hours prior to commencing any work. Contractors are subject to being shut down and or having work rejected if proper notification is not given to the City.

B. Work shall not commence before 7:00 a.m. nor extend beyond 10:00 p.m. Monday thru Friday. On Saturdays, work hours are from 8:00 a.m. to 6:00 p.m. No work is permitted on Sundays or Holidays unless authorized by the City of Richfield. The definition of "work" also includes the starting of equipment and the delivery of materials to the job site.

C. Line and Grade:
1. Conform to lines, elevations, and grades shown on the Drawings.
2. Provide means for accurately transferring line and grade from ground surface stakes to the working point in the trench.

### 3.02 CONSTRUCTION REQUIREMENTS

A. Pipe Installation:
1. Inspect pipe for defects and cracks while suspended before lowering into the trench.
2. Remove, clean, or trim any foreign matter, coating blisters, rough edges or projections and any imperfections so detected on pipe section and fitting.
3. Comply with ASTM D2321 for HDPE installation.
   a. See Drawings for bedding details.
4. Place pipe bell at upstream end of pipe length.
5. Install pipe from lower to higher invert elevation.
6. See Section 31 23 33 for pipe foundation and backfill procedures.
7. Storm sewer pipes which cross the street in areas where soils are highly frost susceptible, shall be backfilled in accordance with the guidelines as are outlined in the MnDOT Road Design Sections 8-6.01.08 and 8-6.01.09.

B. Manhole and Catch Basin Installation:
1. Place precast base on compacted granular subgrade.
2. Granular material shall be placed under all storm sewer pipe or structures that are less than 48-inches below finished grade. Granular material shall extend to at least 48" below finished grade and taper up to the subgrade elevation at not steeper than a 10 percent slope.
3. Install in accordance with drawing details.
4. No steps allowed.
5. Install concrete adjusting rings to provide final horizontal and vertical adjustment within tolerances. Set adjusting rings and casting in a full bed of mortar. All units shall be properly fitted and sealed to form a completely water tight structure. Plaster mortar on outside of structure to a smooth surface. Strike mortar on inside of structure clean and smooth. No shims or blocking will be allowed.
6. Minimum of 1 and maximum of 4 adjusting rings shall be used.
7. Maximum horizontal tolerance: 3 inches in any direction.
8. Construct watertight to prevent groundwater infiltration.
9. Install sediment trapping device in catch basin inlets as directed by Engineer to prevent sediment from entering storm sewer systems during construction. Inlet protection shall be in accordance with MnDOT 3891.

C. Apron Installation:
1. Tie aprons to next six pipe sections using galvanized "U" bolt fasteners.
2. Tie all pipes in and out of skimmer structures.
3. All applicable requirements for pipe installation apply to apron installation.

D. Riprap Installation:
1. Prepare ground area at apron end per Standard Details.
2. Install filter materials as specified in Standard Drawings.

3. Riprap required for various pipe sizes shall be shown on the Standard Drawings, unless otherwise specified.
4. Hand place riprap to a depth of one foot.

E. Connect to Existing Storm Sewer:
1. Connect to Existing Storm Manhole or Catch Basin:
   a. Remove bulkhead or cut existing manhole to provide adequate opening for pipe.
   b. Take necessary precaution to prevent dirt of debris from entering the existing structure.
   c. Install pipe at staked alignment and grade
   d. Install mortar around pipe to provide a minimum 6" watertight collar on outside of structure.
   e. Strike mortar smooth on inside of structure to provide watertight seal.
2. Connect to Existing Storm Pipe
   a. Remove existing bulkhead or pipe at connection point.
   b. Take necessary precaution to prevent dirt of debris from entering the existing structure.
   c. Clean existing pipe bell
   d. Insert pipe spigot end into existing pipe bell end and push into home position.

## 3.03 FIELD QUALITY CONTROL

A. Deflection Test:
1. Perform on HDPE pipe at least 30 days after trench backfill has been placed.
2. Perform test by pulling a mandrel through each line between manholes without aid of mechanical pulling devices.
3. Mandrel Diameter: 95 percent of nominal pipe size.
4. The line will be considered acceptable if mandrel can progress through line without binding.
5. Provide corrective measures for lines not meeting these requirements.

B. Test Failure and Remedy
1. In the event of a test failure on any test section, Contractor shall provide corrective measures for lines not meeting requirements.
2. All repair work shall be subject to approval of the Engineer.
3. Unsatisfactory repairs or test results may result in an order to remove and replace pipe as the Engineer considers necessary for test conformance.
4. All repair and replacement work shall be at the Contractor's expense.

## 3.04 CLEANING

A. Remove all dirt and foreign material from the pipe and structure interiors.

B. Inspection and Flushing
1. Prior to final acceptance of each section of the storm sewer, the Contractor shall flush an approved pipe cleaning ball, the full diameter of the sewer, through all sewer up to 24" in diameter. Larger sewers shall be cleaned by other appropriate methods.
2. All dirt and debris shall be prevented from entering the existing storm sewer system by means of watertight plugs or other suitable methods.
3. All water and debris shall be removed from system by vacuum or other approved method.
4. Upon completion of the Contract, the Engineer shall carefully inspect all sewers and appurtenances. Any unsatisfactory work shall be removed and replaced in a proper manner.
5. The invert of the sewer shall be left smooth, clean and free from any obstructions throughout the entire line.

C. Televising of Lines
1. All sanitary sewer lines shall be televised and the video reports submitted to the City for review.
2. Video reports can be submitted on CD-ROM or DVD.
3. All lines must be flushed and cleaned prior to televising.
4. The video report will be used to view the condition of the sanitary sewer pipe prior to acceptance.
5. Workmanship and cleanliness of the installation will be checked.
6. Video reports will become property of the City and contain the following:

a. Reference to the start and end of each video segment as it begins, by clearly identifying the manhole number where the video segment begins and the manhole number where the video segment ends.
b. Footages along the sewer line must be shown on the video and report and zeroed out at the beginning of each segment starting from the center of the manhole.
c. The video camera should be guided forward at the moderate to slow pace along the bottom of the pipe.
d. The camera should stop and rotate up to view each service wye.
e. The camera should stop at any unusual instances that are viewed while in progress and provide a more detailed and longer view of the specific instance (i.e. – bad joint, dirt in lines, settlement in line, etc.)

**END OF SECTION**